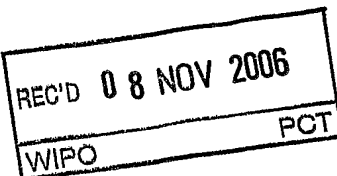


PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT



(PCT Article 36 and Rule 70)



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|---|---|---|
| Applicant's or agent's file reference 057PCT 0212 | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/EP2005/002158 | International filing date (<i>day/month/year</i>) 25.02.2005 | Priority date (<i>day/month/year</i>) 26.02.2004 |
| International Patent Classification (IPC) or both national classification and IPC INV. H01M8/02 C09D5/24 | | |
| Applicant REINZ-DICHTUNGS-GMBH et al. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

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| Date of submission of the demand 14.09.2005 | Date of completion of this report 08.11.2006 |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized Officer Eijkenboom, Thomas Telephone No. +49 89 2399-8616  |

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP2005/002158

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-13 as originally filed

Claims, Numbers

1-10 received on 02.08.2006 with letter of 01.08.2006

Drawings, Sheets

1/2, 2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☒ the claims, Nos.: 11
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/EP2005/002158**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|------|
| Novelty (N) | Yes: Claims | |
| | No: Claims | 1-10 |
| Inventive step (IS) | Yes: Claims | |
| | No: Claims | 1-10 |
| Industrial applicability (IA) | Yes: Claims | 1-10 |
| | No: Claims | |

2. Citations and explanations

see separate sheet

Ad Section V:

1. In relation to the discussion of the prior art documents, reference is made to the passages cited in the International Search Report.
- 1.1 EP 0 851 518 A (D1) discloses a contact plate for fuel cells comprising a corrugated metal sheet (stainless steel, titanium) whereby a brazed coating of an electrically conductive corrosion-resistant metal (Cr, Ni, Ag, Au, Pt, Ti) is present only on the tops of the corrugations and not in the recesses.

D1 does not disclose that the coating consists of carbon and a thermoplastic or thermosetting binding agent.

- 1.2 EP 1 009 051 A (D2) discloses a contact plate for fuel cells comprising corrugated metal sheet (stainless steel, titanium) whereby an adhesive coating of an electrically conductive corrosion-resistant material (carbon, graphite, Ni, Ag, Au, Pt, Ti) is present only on the tops of the corrugations and not in the recesses.

Although D2 also indicates that the coating may comprise carbon dispersed in a thermoplastic or thermosetting binding agent, the surface area comprising the coating is not part of an active area envisaged for contacting a diffusion layer.

- 1.3 US 6 383 678 B1 (D3) discloses a contact plate for fuel cells comprising corrugated metal sheet (stainless steel, Al, Cr, Ni) whereby a membrane coating (23) of an electrically conductive corrosion-resistant material (24) (carbon, noble metal, Ni, Cr) is present only on the tops of the corrugations and not in the recesses.

The applicant has acknowledged that the coated area in D3 is envisaged for contacting a diffusion layer. In accordance with figure 1 of D3, the carbon-containing conductive coating membrane (24) is omitted in bottom regions of the recesses and a coating membrane (23) is continuously covering the plate body. The coating membrane (23) is based on a thermosetting or thermoplastic resin. In the embodiments shown in figures 7 and 10 of D3, the conductive coating membrane (24) and coating membrane (23) are combined in a single continuous layer.

- 1.4 WO 03/044886 A (D4) refers to a contact plate for fuel cells comprising metal sheet (steel) with protruding ribs whereby a coating of an electrically conductive corrosion-resistant material (steel, Ni, Ti, Al) is present only on the tops of the ribs and not in the recesses in between. These ribs, however, are not part of an active area.
- 1.5 DE 102 35 598 A1 (D5) refers to a contact plate for fuel cells comprising a corrugated metal sheet (steel, Cu, Ti, Al) whereby a coating of an electrically conductive corrosion-resistant material comprising carbon and/or graphite and a thermoplastic or thermosetting binding agent may be partially present only on the corrosion sensitive areas whereby an explicit indication that this concerns the corrugation tops is missing.
- 1.6 It follows from the above discussion that a coating of an electrically conductive corrosion-resistant material consisting of carbon and a thermoplastic or thermosetting binding agent is known from at least D2, D3 and D5 as well as from the document cited in the description (EP-A-1.107.340: D6).

It is also known from D1, D2 and D3 to coat only the corrugation tops and omit the coating in bottom regions of the recesses.

With regard to D2, it appears arbitrary whether the coating is present on the side envisaged for contacting a diffusion layer or not since the corrosion-resistance is required on either side. Without further unexpected differentiating technical effects, the contact plate may be considered suitable for use with the coated side contacting a diffusion layer whereby the novelty of claim 1 is prejudiced (Art.33(2) PCT).

- 1.7 Notwithstanding the above, the skilled person starting from either one of D3, D5 or D6 as closest prior art and seeking to lower the material expense of the coating would be hinted by the teaching in either one of D1, D2 or D3 to apply the coating only to the corrugation tops and thereby manufacture the contact plate with an as low as possible expense.

Hence, even if the subject-matter of claim 1 would be considered novel, it still would lack an inventive step over the cited prior art (Art.33(3) PCT).

- 1.3 Moreover, the contact plate known from either one of D1 to D5 is also used in a fuel cell or fuel cell stack and, thus, the subject-matter of claim 7 is also not known.
- 1.4 Similarly, the subject-matter of claims 8 and 9 is also known, since the coating in D1 and D2 is deposited by roller printing, whilst D3 refers to screen printing and D4 to screen printing and tampon plating.
2. In the light of the cited prior art, the remaining dependent claims 2-6, 10, 11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).
3. The description is not adapted to the amended claims (Art.6 PCT).

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5 Amended claims

1. A contact plate for fuel cells with a coherent active area on at least one side of the contact plate, said side envisaged for contacting a diffusion layer, a fuel cell electrode or an electrolyte membrane, wherein the contact plate is manufactured on the basis of a plate body of passivating, corrosion-resistant metal and wherein the active area consists of a contact surface which over the whole surface comprises a coating of an electrically conductive, corrosion-resistant material, and of recesses, so that the recesses form a channel structure, characterised in that the coating (4) consists of carbon and a thermoplastic or duroplastic binding agent for depositing in liquid form and that the coating (4) is omitted at least in bottom regions (5) of the recesses (3).
2. A contact plate according to claim 1, characterised in that the plate body (1) is of stainless steel or titanium.
3. A contact plate according to one of the claims 1 or 2, characterised in that the coating (4) extends exclusively over the contact surface (2).
4. A contact plate according to one of the claims

1 to 3, characterised in that the coating (4) leaves free an edge region (12) of the mentioned side of the contact plate outside the active area (11).

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5. A contact plate according to one of the claims 1 to 4, characterised in that the coating (4) contains carbon, in the form of graphite.

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6. A contact plate according to one of the claims 1 to 5, characterised in that it has a material thickness between 0.05 mm and 0.5 mm, preferably between 0.07 and 0.2 mm.

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7. A fuel cell or fuel cell stack containing at least one contact plate according to one of the claims 1 to 6 as a monopolar, bipolar and/or end plate.

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8. A method for manufacturing a contact plate according to one of the claims 1 to 6, characterised in that the coating (4) is deposited by a screen printing, roller printing or stencil printing method or by way of a metering method.

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9. A method according to claim 8, characterised in that the recesses (3) remain free of the coating (4) without prior masking of the recesses (3).

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10. A method according to one of the claims 8 or 9, characterised in that the coating (4) during and/or after the deposition is melted or cured by way of heating the contact plate.

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